Amendment to the Claims

This listing of claims will replace all prior versions, and listing, of claims in the application.

Please amend the claims as follows:

Claim 1 (currently amended): An isolated, synthetic or recombinant nucleic acid comprising (a) a consecutive sequence having at least 95% sequence identity to the sequence of SEQ ID NO:1 and encoding a polypeptide having polymerase activity, (b) a sequence that encodes a polypeptide having polymerase activity that is an enzymatically active fragment of the polypeptide of (a), or, (c) sequences fully complementary to the full length of (a) or (b).

Claim 2 (previously presented): The isolated, synthetic or recombinant nucleic acid of claim 28, wherein the polymerase activity is retained at the temperature for four or more hours.

Claim 3 (currently amended): The isolated, synthetic or recombinant nucleic acid of claim 1, comprising [[a]] the sequence as set forth in SEQ ID NO:1, or, sequences fully complementary to the full length thereof ~~thereto~~.

Claim 4 (currently amended): An isolated, synthetic or recombinant nucleic acid comprising (a) a consecutive sequence encoding a polypeptide having polymerase activity, wherein the nucleic acid hybridizes to SEQ ID NO:1, under highly stringent hybridization conditions comprising about 68°C in 50% formamide, 5X SSPE, 0.3% SDS, and 200 ng/ml sheared and denatured salmon sperm DNA, and a wash step comprising a wash at 30 minutes at room temperature in a solution comprising 150 mM NaCl, 20 mM Tris hydrochloride, pH 7.8, 1 mM Na_2EDTA, 0.5% SDS, followed by a 30 minute wash in fresh solution, or, (b) a sequence fully complementary to the full length of (a).

Claim 5 (currently amended): An isolated, synthetic or recombinant nucleic acid comprising (a) a consecutive sequence encoding a polypeptide having polymerase activity that hybridizes to SEQ ID NO:1, under highly stringent hybridization conditions comprising about 68°C in 0.1 x SSC

0.5% SDS, and 200 ng/ml sheared and denatured salmon sperm DNA, for 15 to 30 minutes, and a wash in a buffer comprising 0.1X SSC, 0.5% SDS for 15 to 30 minutes at between room temperature and 68°C, or a wash step comprising a wash at 30 minutes at room temperature in a solution comprising 150 mM NaCl, 20 mM Tris hydrochloride, pH 7.8, 1 mM Na_2EDTA, 0.5% SDS, followed by a 30 minute wash in fresh solution, or, wash conditions comprising 0.15M NaCl for 15 minutes at about 72°C, or (b) a sequence fully complementary to the full length of (a).

Claim 6 (previously presented): The isolated, synthetic or recombinant nucleic acid of claim 4, wherein the hybridization conditions further comprise a wash for about 30 minutes at room temperature in a buffer comprising 150 mM $NaCl_2$, 20 mM Tris hydrochloride, pH 7.8, 1 mM Na_2EDTA, 0.5% SDS, followed by a 30 minute wash in fresh buffer at Tm-10°C.

Claim 7 (previously presented): The isolated, synthetic or recombinant nucleic acid of claim 1, wherein the sequence identity is determined by analysis with a sequence comparison algorithm.

Claim 8 (canceled)

Claim 9 (currently amended): An isolated, synthetic or recombinant nucleic acid comprising (a) a sequence that encodes a polypeptide having polymerase activity having at least 97% sequence identity to SEQ ID NO:1 or (b) a sequence that encodes a polypeptide having polymerase activity that is an enzymatically active fragment of the polypeptide of (a), or, (c) a sequence fully complementary to the full length of the sequence of (a) or (b).

Claim 10 (currently amended): An isolated, synthetic or recombinant nucleic acid comprising (a) a sequence that encodes a polypeptide having polymerase activity having at least 99% sequence identity to SEQ ID NO:1, or, (b) a sequence that encodes a polypeptide having polymerase activity that is an enzymatically active fragment of the polypeptide of (a), or, (c) a sequence fully complementary to the full length of the sequence of (a) or (b).

Claim 11 (previously presented): The isolated, synthetic or recombinant nucleic acid of claim 7, wherein the sequence comparison algorithm is FASTA version 3.0t78 with the default parameters.

Claim 12 (currently amended): An isolated, synthetic or recombinant nucleic acid comprising (a) a sequence that encodes a polypeptide having polymerase activity, wherein the polymerase-encoding sequence comprises SEQ ID NO:1, or a sequence encoding enzymatically active fragments of SEQ ID NO:2; or, (b) a sequence fully complementary to the full length of the nucleic acid sequence (a).

Claims 13 to 15 (canceled)

Claim 16 (currently amended): An isolated, synthetic or recombinant nucleic acid encoding (a) a polypeptide having polymerase activity and **[[**a**]]** the sequence as set forth in SEQ ID NO:2, or (b) enzymatically active fragments of (a).

Claims 17 to 27 (canceled)

Claim 28 (previously presented): The isolated, synthetic or recombinant nucleic acid of claim 1, wherein the polypeptide has polymerase activity at a temperature in a range from about 90°C to 113°C.

Claim 29 (previously presented): The isolated, synthetic or recombinant nucleic acid of claim 1, wherein the polypeptide has polymerase activity at a temperature up to 150°C.

Claim 30 (previously presented): The isolated, synthetic or recombinant nucleic acid of claim 1, wherein the polymerase activity comprises DNA polymerase activity.

Claim 31 (currently amended): The isolated, synthetic or recombinant nucleic acid of claim 1, wherein the polymerase activity comprises 3'-5' exonuclease activity.

Claim 32 (previously presented): The isolated, synthetic or recombinant nucleic acid of claim 1, wherein the polymerase lacks a 3'-5' exonuclease activity.

Claim 33 (previously presented): The isolated, synthetic or recombinant nucleic acid of claim 1, wherein the polypeptide has polymerase activity in salinity conditions from 5 mM to 200 mM salt.

Claim 34 (withdrawn): A method for amplifying a nucleic acid comprising using a polymerase as set forth in claim 1.

Claim 35 (withdrawn): The method of claim 34, wherein the amplification reaction is a polymerase chain reaction (PCR).

Claim 36 (previously presented): The isolated, synthetic or recombinant nucleic acid of claim 1, wherein the nucleic acid further comprises an expression vector.

Claim 37 (previously presented): The isolated, synthetic or recombinant nucleic acid of claim 36, wherein the expression vector comprises a viral particle, a baculovirus, a phage, a plasmid, a cosmid, a fosmid, a bacterial artificial chromosome, a viral DNA or a P1-based artificial chromosome.

Claim 38 (withdrawn): A method for identifying functional polymerases comprising:

modifying the sequence of a polypeptide encoded by a nucleic acid as set forth in claim 1 and testing the DNA polymerase activity of the modified polypeptide in a PCR amplification at extreme high temperature for four or more hours and under conditions that allow said polypeptide or fragment or variant to function, and

detecting formation of an amplification product, wherein formation of the amplification product identifies a functional DNA polymerase.

Claim 39 (previously presented): A method for making a polypeptide comprising:
(a) providing a nucleic acid having a sequence set forth in claim 1 or claim 12; and
(b) expressing the sequence, thereby expressing the polypeptide.

Claim 40 (previously presented): The method of claim 39, wherein the nucleic acid further comprises an expression vector.

Claim 41 (previously presented): The method of claim 39, further comprising inserting the nucleic acid into a host cell and expressing the sequence in the host cell.

Claim 42 (previously presented): The method of claim 41, wherein the host cell is a prokaryotic or a eukaryotic cell.

Claim 43 (previously presented): The method of claim 41, wherein the host cell is a yeast cell, a bacterial cell, a mammalian cell, a fungal cell, an insect cell or a plant cell.

Claim 44 (withdrawn): A method for producing a biologically active polypeptide and screening the polypeptide for enhanced activity by:
(a) introducing at least a first polynucleotide and a second polynucleotide, the at least first polynucleotide and second polynucleotide sharing at least one region of partial sequence homology, into a suitable host cell, wherein the first or second polynucleotide comprises a sequence as set forth in claim 1 or claim 12;
(b) growing the host cell under conditions which promote sequence reorganization, resulting in a hybrid polynucleotide;
(c) expressing a hybrid polypeptide encoded by the hybrid polynucleotide of (b); and

(d) screening the hybrid polypeptide of (c) for biological activity under conditions which promote identification of enhanced biological activity.

Claim 45 (canceled)

Claim 46 (currently amended): An isolated, synthetic or recombinant nucleic acid comprising (a) a sequence having at least 95% sequence identity to SEQ ID NO:1 and encoding a polypeptide having polymerase activity, wherein the polypeptide has the sequence as set forth in SEQ ID NO: 2, and at least one conservative amino acid residue substitution, (b) a sequence that encodes a polypeptide having a polymerase activity that is an enzymatically active fragment of the polypeptide of (a), or, (c) a sequence fully complementary to the full length of (a) or (b),

wherein the conservative amino acid residue substitution comprises substitution of one amino acid for another of the same class.

Claim 47 (previously presented): The isolated, synthetic or recombinant nucleic acid of claim 46, wherein the at least one conservative amino acid residue substitution comprises substitution of one hydrophobic amino acid for another, or substitution of one polar amino acid for another.

Claim 48 (previously presented): The isolated, synthetic or recombinant nucleic acid of claim 47, wherein the at least one conservative hydrophobic amino acid residue substitution comprises substitution of at least one isoleucine, valine, leucine or methionine, for another.

Claim 49 (previously presented): The isolated, synthetic or recombinant nucleic acid of claim 47, wherein the at least one polar amino acid residue substitution comprises substitution of arginine for lysine, glutamic acid for aspartic acid, or glutamine for asparagine.

Claim 50 (canceled)

Claim 51 (currently amended): An isolated, synthetic or recombinant nucleic acid that encodes a polymerase, wherein the polymerase comprises (a) a sequence having at least 95% sequence identity to SEQ ID NO:2, or (b) an enzymatically active fragment of (a), or, (c) a sequence fully complementary to the full length of (a) or (b).

Claim 52 (currently amended): An isolated, synthetic or recombinant nucleic acid that encodes a polymerase, wherein the polymerase comprises (a) a sequence that is a variant of SEQ ID NO:2, and the variant polymerase sequence has at least 97% sequence identity to SEQ ID NO:2, or (b) an enzymatically active fragment of (a), or, (c) a sequence fully complementary to the full length of (a) or (b).

Claim 53 (previously presented): An isolated, synthetic or recombinant nucleic acid that encodes a polymerase, wherein the polymerase comprises a sequence that is a variant of SEQ ID NO:2, and the variant polymerase sequence is encoded by a nucleic acid that hybridizes under highly stringent conditions to SEQ ID NO:1,

wherein the highly stringent hybridization conditions comprise hybridization at about 68°C in 0.1 x SSC, 0.5% SDS, and 200 ng/ml sheared and denatured salmon sperm DNA, for 15 to 30 minutes, and a wash step comprising a wash at 30 minutes at room temperature in a solution comprising 150 mM NaCl, 20 mM Tris hydrochloride, pH 7.8, 1 mM Na_2EDTA, 0.5% SDS, followed by a 30 minute wash in fresh solution.

Claim 54 (canceled)

Claim 55 (previously presented): The isolated, synthetic or recombinant nucleic acid of claim 4 or claim 5, wherein the nucleic acid has at least 97% sequence identity to [[a]] the sequence as set forth in SEQ ID NO:1.